

## CLAIMS

1. A method of power control for conserving energy in a facility having synchronous machines, comprising the steps of:

monitoring the incoming power to the facility;

monitoring the reactive power demand of the facility;

monitoring the operation of the synchronous machines in the facility;

selecting an operation mode of the synchronous machines to bring the power factor to an optimum; and

adjusting excitation parameters of the synchronous machines to achieve a selected operation mode for them and conserve energy in the facility.

2. The method of Claim 1, wherein the step of monitoring incoming power comprises the step of:

monitoring the power factor of the incoming power at a utility interface with the facility.

3. The method of Claim 1, wherein the step of monitoring incoming power comprises the step of:

monitoring voltage levels of the incoming power at a utility interface with the facility.

4. The method of Claim 1, wherein the step of monitoring the operation of the synchronous machines comprises the step of:

monitoring the status of the synchronous machines.

5. The method of Claim 1, wherein the step of monitoring the operation of the synchronous machines comprises the step of:

monitoring the loading of the synchronous machines.

6. The method of Claim 1, wherein the step of monitoring the operation of the synchronous machines comprises the step of:

monitoring the real power of the synchronous machines.

7. The method of Claim 1, wherein the step of monitoring the operation of the synchronous machines comprises the step of:

monitoring the reactive power of the synchronous machines.

8. The method of Claim 1, wherein the step of monitoring the operation of the synchronous machines comprises the step of:

forming a measure of the power capability of the synchronous machines; and

determining the present operating point of the synchronous machine with respect to the measures of its power capability.

9. The method of Claim 1, wherein the step of selecting an operation mode comprises the step of:

selecting a constant power factor mode as the operation mode of the synchronous machine.

10. The method of Claim 1, wherein the step of selecting an operation mode comprises the step of:

selecting a constant voltage mode as the operation mode of the synchronous machine.

11. The method of Claim 1, wherein the step of selecting an operation mode comprises the step of:

selecting a constant reactive power mode as the operation mode of the synchronous machine.

12. A power control system for conserving energy in a facility having synchronous machines, comprising

sensor devices for monitoring the incoming power to the facility;

sensor devices for monitoring the reactive power demand of the facility;

a computer containing a programmed set of instructions for monitoring the operation of the synchronous machines in the facility;

a computer containing a programmed set of instructions for selecting an operation mode of the synchronous machines to bring the power factor to an optimum; and

the computer further sending signals to the synchronous machines and adjusting excitation parameters of the synchronous machines to achieve a selected operation mode for them and conserve energy in the facility.

13. The power control system of Claim 12, wherein the sensor devices for monitoring incoming power comprise:

sensor devices for monitoring the power factor of the incoming power at a utility interface with the facility.

14. The power control system of Claim 12, wherein the sensor devices for monitoring incoming power comprise:

sensor devices for monitoring voltage levels of the incoming power at a utility interface with the facility.

15. The power control system of Claim 12, wherein the sensor devices for monitoring the operation of the synchronous machines comprise:

sensor devices for monitoring the status of the synchronous machines.

16. The power control system of Claim 12, wherein the set of instructions of the computer for monitoring the operation of the synchronous machines comprises:

instructions for causing the computer to monitor the loading of the synchronous machines.

17. The power control system of Claim 12, wherein the set of instructions for the computer for monitoring the operation of the synchronous machines comprises:

instructions for causing the computer to monitor the real power of the synchronous machines.

18. The power control system of Claim 12, wherein the set of instruction of the computer for monitoring the operation of the synchronous machines comprises:

instructions for causing the computer to monitor the reactive power of the synchronous machines.

19. The power control system of Claim 12, wherein the set of instructions of the computer for monitoring the operation of the synchronous machines comprises:

instructions for causing the computer to form a measure of the power capability of the synchronous machines; and

instructions for causing the computer to determine the present operating point of the synchronous machine with respect to the measures of its power capability.

20. The power control system of Claim 1, wherein the set of instructions of the computer for selecting an operation mode comprises:

instructions for causing the computer to select a constant power factor mode as the operation mode of the synchronous machine.

21. The power control system of Claim 12, wherein the set of instructions of the computer for selecting an operation mode comprises:

instructions for causing the computer to select a constant voltage mode as the operation mode of the synchronous machine.

22. The power control system of Claim 12, wherein the set of instructions of the computer for selecting an operation mode comprises:

instructions for causing the computer to select a constant reactive power mode as the operation mode of the synchronous machine.

23. A method of supporting power supply bus voltage in a facility having motors and synchronous machines in connection with starting a motor in the facility, comprising the steps of:

increasing the field current of the running synchronous machines prior to start of the motor to produce reaction power; and

maintaining the field current of the synchronous machines at the increased level to produce reactive power until a specified condition occurs.

24. The method of Claim 23, wherein the specified condition is the motor being started having obtained a specified operating speed.

25. The method of Claim 23, wherein the specified condition is a specified time elapsing without the motor having started.

26. The method of Claim 23, wherein the step of increasing comprises the step of:

increasing the field current to a plurality of the synchronous machines prior to start of the motor to produce reactive power.

27. The method of Claim 23, wherein the step of increasing comprises the step of:

increasing the field current of the running synchronous machines prior to start of the motor to produce reactive power in excess of its rated power.

28. The method of Claim 23, wherein the step of increasing comprises the step of:

increasing the field current of the running synchronous machines prior to start of the motor to produce reactive power to a range of from 100% to 150% of its rated power.

29. A method of supporting power supply bus voltage in a facility having transformers and synchronous machines in connection with energizing of a transformer in the facility, comprising the steps of:

increasing the field current of the running synchronous machines prior to energizing the transformer to produce reactive power.



30. A power control system for a facility having motors and synchronous machines and having support of bus voltage in connection with starting of a motor in the facility, comprising:

a computer causing the field current of the running synchronous machines to increase for the synchronous machines to produce reactive power; and

the computer causing the field current to the synchronous machine to be maintained at the increased level to produce reactive power until a specified condition occurs.

31. The power control system of Claim 30 wherein the specified condition is the motor being started having obtained a specified operating speed.

32. The power control system of Claim 31, wherein the specified condition is a specified time elapsing without the motor having started.